Salt -the Greatest Myth in the History of Modern Medicine

"The great enemy of truth is very often not the lie – deliberate, contrived and dishonest – but the myth – persistent, persuasive, and unrealistic."

John F. Kennedy Yale Commencement Address,1962.

Morton Satin
Vice President, Science & Research
Salt Institute, Naples, FL 34102 USA

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

The Outcome of a Medical Myth

U.S. Food and Drug Administration
Protecting and Promoting *Your* Health

Voluntary Sodium Reduction Goals: Target for Sodium in Commercially Processed, and Prepared Foods: Guidance for Industry

World's largest food companies immediately welcome U.S. FDA's sodium guidance for industry

Action in June 2016, based upon long held assumptions that were a myth, yet will effect the entire food supply and diet of Americans and others .

Untrue Assumptions Leading to FDA Action

1. Americans eat more salt than ever before in recorded history
2. Levels of current salt consumption lead to hypertension
3. Americans can massively reduce their salt consumption without any dietetic turmoil or negative health consequences
4. The methodology employed to demonstrate the role of salt in the etiology of hypertension is proper and precise
5. The US population will gain significant health benefits from major population-wide salt reduction.

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Myth 1 - Americans Eat More Salt Than Ever Before In Recorded History

-Current level of salt consumption in the US is ~ 8.5g (1½ tsp/day)-

1. First recorded written accounts of salt consumption date from War of 1812 rations for soldiers and prisoners of war.[1]
2. Rations for Continental Army 18g/day. American prisoners of war in England's Dartmoor prison were allocated only 9g/day and complained bitterly.[2]
3. Rations for American Troops in Mexican War (1838) were 18g/day. Congress enacted US Civil war rations for Union Army (1860/61) as 18g/day. & Spanish American War.[2]
4. World War I – 18½ g/day. [3] World War II – 20g/day.[4]

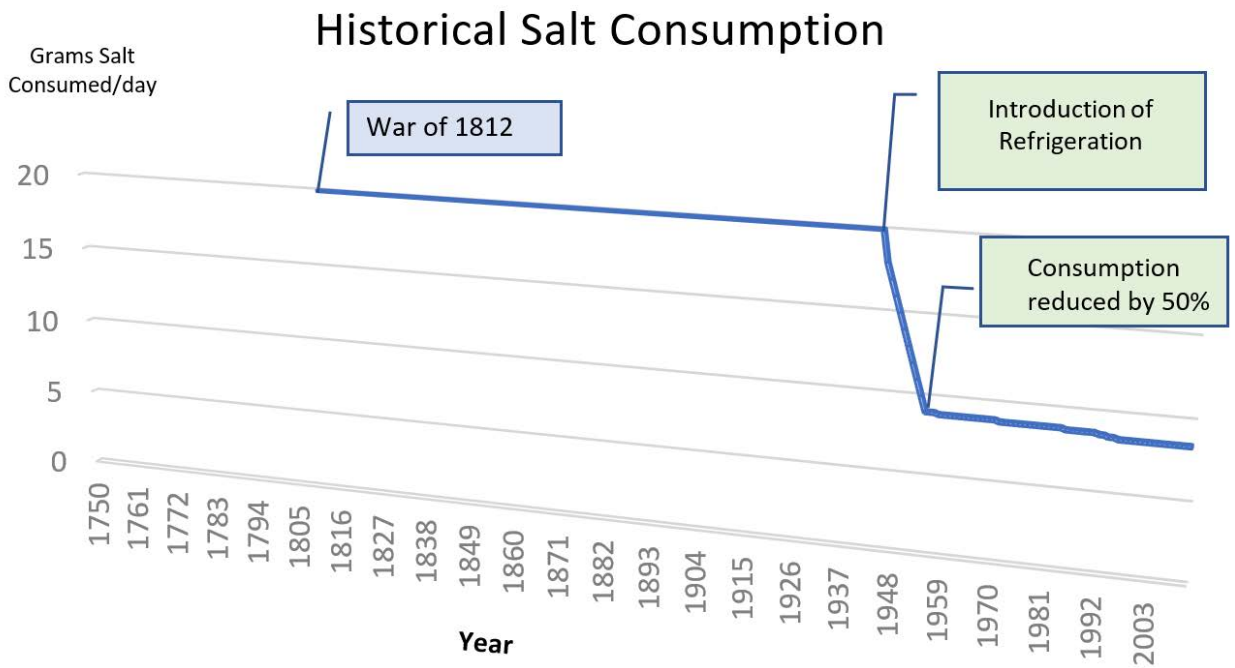
---

1. Rations: The History of Rations, Conference Notes, Prepared by The Quartermaster School for the Quartermaster General, January 1949.
2. James Adams, Dartmoor Prison, A Faithful Narrative of the Massacre of American Seamen, to Which is added a Sketch of the Treatment of Prisoners During the Late War by the British Government (Pittsburgh, S. Engles, 1816).
3. Special Rations for the Armed Forces, 1946-53", By Franz A. Koehler, QMC Historical Studies, Series II, No. 6, Historical Branch, Office of the Quartermaster General, Washington D.C. 1958.
4. Koehler FA. Special rations for the armed forces, 1946–53. QMC historical studies, series II:6: historical branch. Washington, DC: Office of the Quartermaster General; 1958. American Prisoners of War in Germany, Prepared by Military Intelligence Service War Department, November 1945, Restricted Classification Removed - STALAG 17B (Air Force Non-Commissioned Officers) accessed at: http://www.valerosos.com/AMERICANPRISONERSOFWAR.pdf Accessed 0o on 2/12/1018

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

The Actual Figures

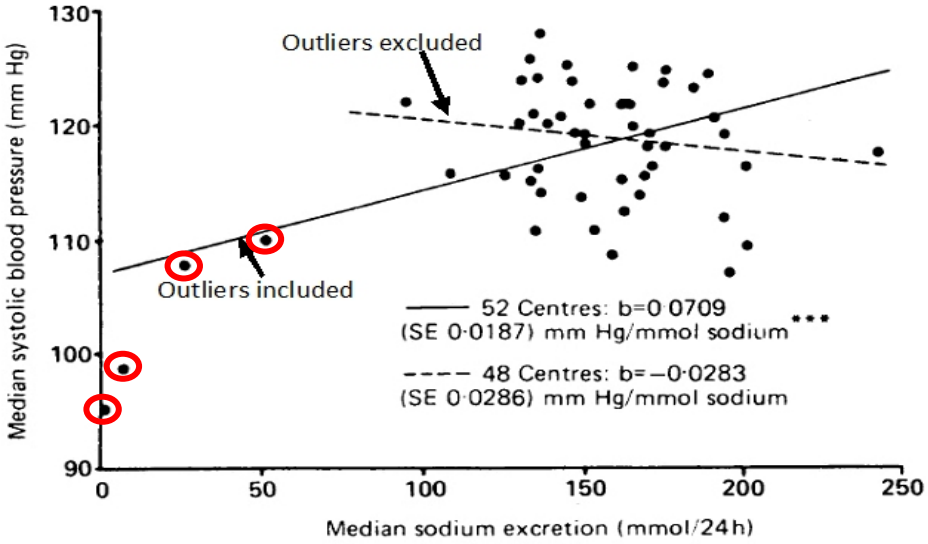


Reality: We now eat less salt than ever in <u>recorded</u> history

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Myth 2 - Current Levels of Salt Consumption Lead to Hypertension



The Intersalt Study

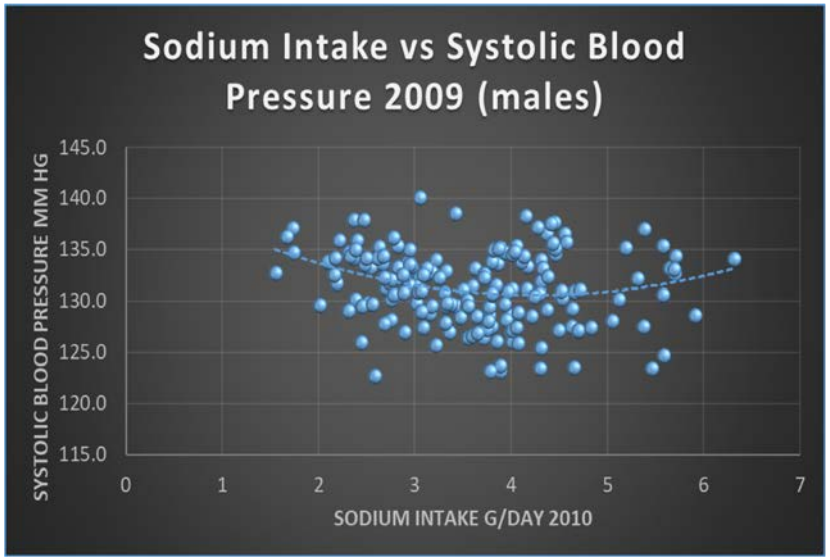
Key Flaws:

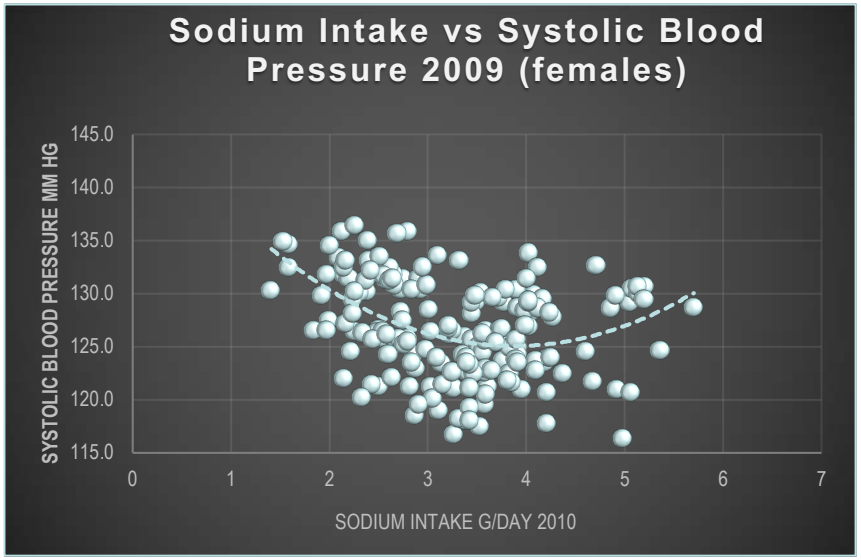
- Outliers included (Very Low D/D polymorphism – Very Low BP)
- Genetics ignored
- Not a single Arab population included (Very High D/D polymorphism – Very High BP)
- Single 24 HrUrNa was standard measure of consumption

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Sodium and SBP WHO Published Data





Data from Global Health Observatory of the WHO. Accessed at http://apps.who.int/gho/data/node.main.A882 on 9/29/2014

Reality: For the majority of population Na intake is unrelated to Hypertension

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Myth 3 - We Can Greatly Reduce Salt Consumption without Negative Dietetic or Health Consequences

- It is highly unlikely that we can maintain a normal diet with a great reduction in salt.[1]
- Major reductions in salt intake may increase risk of insulin resistance,[2] mortality from Type I[3] and Type II[4] diabetes, cardiovascular events,[5,6,7] negative impacts on blood pressure and hypertension,[8] increased levels of renin, aldosterone, catecholamines, cholesterol[9] and increased mortality.[10]

1 Maillot M, Drewnowski A. A Conflict Between Nutritionally Adequate Diets and Meeting the 2010 Dietary Guidelines for Sodium. Am J Prev Med 2012;42(2):174 –179.
2 Garg R, William GH, Hurwitz S, Brown NJ, Hopkins PN, Adlera GK. Low-salt diet increases insulin resistance in healthy subjects. Metabolism. 2011;60(7):965-8.
3 Thomas MC, Moran J, Forsblom C, et al; for the FinnDiane Study Group. The Association between Dietary Sodium Intake, ESRD, and All-Cause Mortality in Patients with Type 1 Diabetes. Diabetes Care. 2011;34(4):861-866
4 Ekinci EI, Clarke S, Thomas MC, et al. Dietary Salt Intake and Mortality in Patients with Type 2 Diabetes. Diabetes Care. 2011;34:703-09.
5 O'Donnell MJ, Yusuf S, Mente A, et al. Urinary sodium and potassium excretion and risk of cardiovascular events. JAMA. 2011 Nov 23;306(20):2229-38.
6 O'Donnell MJ, Mente A, Smyth A, Yusuf S. Salt intake and cardiovascular disease: why are the data inconsistent? Eur Heart J. 2013;34(14):1034-40.
7 Alderman MH, Cohen HW. Dietary Sodium Intake and Cardiovascular Mortality: Controversy Resolved? Am J Hypertens. 2012;25(7):727-734.
8 Stolarz-Skrzypek K, Kuznetsova T., Thijs L, et al. Fatal and Nonfatal Outcomes, Incidence of Hypertension, and Blood Pressure Changes in Relation to Urinary Sodium Excretion. JAMA. 2011;305(17):1777-85
9 Graudal NA, Hubeck-Graudal T, Jurgens J. Effects of Low-Sodium Diet Vs High-Sodium Diet on Blood Pressure, Renin, Aldosterone, Catecholamines, Cholesterol and Triglyceride (Cochrane Review). Am J Hypertens. 2012;25(1):1-15.
10 Graudal N, Jürgens G, Baslund B, Alderman MH. Compared With Usual Sodium Intake, Low- and Excessive-Sodium Diets Are Associated With Increased Mortality: A Meta-Analysis. Am J Hypertens. 2014; Apr 26. Epub ahead of print.doi:10.1093/ajh/hpu028.

Reality: Significant dietary salt reduction is impractical and risky to health

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Myth 4 - The Methodology Used to Estimate Salt Consumption and its Role in The Etiology of Hypertension is Sound and Precise

Salt intake and urinary sodium excretion are not directly related on a daily basis[1,2,3] due to an inherent circaseptan (7-day) rhythm in excretion.[4] Therefore, a single 24Hr Urinary collection is not representative of daily consumption. An average of 7 full 24HR Ur collections is required for an accurate estimation.

Consumption of sodium levels below 200mmols/day results in increasing RAAS activity and sodium conservation. Therefore, at consumptions of <200mmols/day, a sodium conservation artifact (error) is introduced, but has never been acknowledged, measured or corrected for in the history of sodium consumption research.[5]

1 Warner GF, Sweet NJ, Dobson EL. "Sodium space" and body sodium content, exchangeable with sodium24, in normal individuals and patients with ascites. Circulat. Res. 1953; 1:486-490.

2 Moore FD, Edelman IS, Olney JM, James AH, Brooks L, Wilson GM. Body sodium and potassium. III. Interrelated trends in alimentary, renal and cardiovascular disease; lack of correlation between body stores and plasma concentration. Metabolism. 1954; 3: 334-350.

3 Edelman IS, James AH, Baden H, Moore FD. Electrolyte composition of bone and the penetration of radiosodium and deuterium oxide into dog and human bone. J Clin Invest. 1954;33: 122–131.

4 Rakova N, Juttner K, Dahlmann A et al. Long-term space flight simulation reveals infradian rhythmicity in human Na(þ) balance. Cell Metab. 2013;17:125–131.

5 Satin M. Personal observation. 2012.

Reality: The current Gold Standard for estimating sodium consumption (single 24HrUr Collection) is unsound.

WORLD SALT SYMPOSIUM

June 19-21, 2018 Park City UT, USA

Myth 5 -The US Population Would Gain Significant Health Benefits from Major Population-Wide Salt Reduction

It is generally agreed that salt intake has a very weak or non-existent relationship with hypertension for most individuals.[1,2,3,4]

There is a very limited benefit of a 1-5 mmHg reduction in systolic BP and 1-2 mmHg diastolic BP, for the small minority that is sensitive.

1 Sharma S, McFann K, Chonchol M, Kendrick J. Dietary sodium and potassium intake is not associated with elevated blood pressure in US adults with no prior history of hypertension. J Clin Hypertens (Greenwich). 2014 Jun;16(6):418-23. doi: 10.1111/jch.12312. Epub 2014 Apr 11.

2 Harlan WR, Hull AL, Schmouder RL, Landis JR, Thompson FE, Larkin FA. Blood pressure and nutrition in adults. The National Health and Nutrition Examination Survey. Am J Epidemiol. 1984;120:17–28.

3 Buendia JR, Bradlee ML, Daniels SR, Singer MR, Moore LL. Longitudinal effects of dietary sodium and potassium on blood pressure in adolescent girls. JAMA Pediatr. 2015 Jun;169(6):560-8.

4 Moore LL, Singer MR, Loring Bradlee M. Low Sodium Intakes are Not Associated with Lower Blood Pressure Levels among Framingham Offspring Study Adults. The FASEB Journal 2017;31:1_supplement, 446.6-446.6

Reality: There are no significant health benefits for the majority, non-salt-sensitive population. In fact, salt reduction may increase health risks.

A Policy of Provoking Population-Wide Salt Reduction

This will place 330 million Americans into the largest clinical trial in history, without their knowledge or their permission.

If the preponderance of overall health consequence data on sodium/health is correct, sodium reduction will expose an entire population to an increased risk of morbidity and mortality.

The Government health authorities, the anti-salt consumer advocates and those food industries that promote and comply with sodium-reduction recommendations that are not based on sound science must be held directly responsible for the negative health outcomes to consumers.

Thank you!

Morton Satin
Vice President, Science & Research
Salt Institute, Naples, FL 34102 USA